

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant(s):	§	Attorney Docket No.:
Ching-Yu Chang, et al.	§	2003-1435 / 24061.911
	§	
Serial No.: 10/802,087	§	Customer No. 42717
	§	
Filed: March 16, 2004	§	Group Art Unit: 1714
	§	
For: METHOD AND SYSTEM FOR	§	Examiner: Stephen K. Ko
IMMERSION LITHOGRAPHY	§	
LENS CLEANING	§	Confirmation No.: 4048

Commissioner for Patents  
**Mail Stop Appeal Brief - Patents**  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

Sir:

A timely Notice of Appeal was previously filed on July 30, 2010 along with a Request for a Pre-Appeal Brief Conference, in order to initiate an appeal from the action of the Primary Examiner in finally rejecting all of the pending claims (Claims 2-27) in a Final Office Action mailed on April 7, 2010. A Notice of Panel Decision from Pre-Appeal Brief Review was mailed on August 13, 2010 indicating that the application remains under appeal. This Appeal Brief is being filed pursuant to the provisions of 37 C.F.R. § 41.37.

**TABLE OF CONTENTS**

Real Party in Interest.....	3
Related Appeals and Interferences.....	4
Status of Claims .....	5
Status of Amendments .....	6
Summary of Claimed Subject Matter .....	7
Grounds of Rejection to be Reviewed on Appeal.....	11
Argument .....	13
Conclusion .....	27
Claims Appendix .....	28
Evidence Appendix.....	31
Related Proceedings Appendix .....	32

**REAL PARTY IN INTEREST**

The real party in interest is Taiwan Semiconductor Manufacturing Co., Ltd., an entity organized under the laws of Taiwan, R.O.C., and having a place of business at 121 Park Avenue 3, Science-Based Industrial Park, Hsin-Chu, Taiwan, R.O.C.

In this regard, the inventors assigned their rights in the invention to Taiwan Semiconductor Manufacturing Co., Ltd. in an Assignment that is recorded in the assignment records of the U.S. Patent and Trademark Office at Reel 015118, Frame 0889.

**RELATED APPEALS AND INTERFERENCES**

There are no prior or pending appeals, interferences, or judicial proceedings known to appellant, appellant's legal representative, or the assignee that may be related to, directly affect, be directly affected by or have a bearing on the Board's decision in the present appeal.

**STATUS OF CLAIMS**

Claims 2-27 are pending, stand finally rejected, and are on appeal here. Claim 1 was canceled without prejudice to or disclaimer of the subject matter therein. Accordingly, claims 2-27 are set forth in a Claims Appendix attached hereto with only claims 2-27 on appeal here.

### **STATUS OF AMENDMENTS**

A Final Office Action was mailed on April 7, 2010. A Notice of Appeal was filed on July 30, 2010 along with a Request for a Pre-Appeal Brief Conference, in order to initiate an appeal from the action of the Primary Examiner in finally rejecting all of the pending claims (Claims 2-27). A Notice of Panel Decision from Pre-Appeal Brief Review was mailed on August 13, 2010 indicating that the application remains under appeal.

No amendments to the claims, specification, or drawings have been made subsequent to the Final Office Action being mailed.

### **SUMMARY OF CLAIMED SUBJECT MATTER**

To further clarify the summary of the claimed subject matter, at least some representative portions of the specification and drawings related to the recited claim elements are set forth parenthetically below. However, there may be further portions of the specification and/or drawings that are also relevant to the claimed subject matter.

The present invention, in one embodiment, as now set forth in Independent Claim 6, relates to a method for cleaning lens used in an immersion lithography system (ILS), the method comprising:

positioning a wafer in the ILS; Page 3; par. [0025], line 7-8; Figs. 4, 5a, and 5b.

performing a light exposing operation on the wafer using an objective lens immersed in a first fluid containing surfactant; and; Page 3; par. [0025], line 23-27; par. [0027], lines 1-8; Figs. 4, 5a, and 5b; original claim 1.

cleaning the objective lens after the light exposing operation using a second fluid having a higher surfactant concentration than the first fluid; Pages 2-4; par. [0021], lines 3-10; par. [0022], lines 1-17; par. [0023], lines 21-32; par. [0024], lines 1-15; par. [0029], line 1-5; par. [0030], line 1-7; Fig. 5b; original claim 6.

The subject matter recited in Independent Claim 9 of the present application relates to a method for cleaning lens used in an immersion lithography system (ILS), the method comprising:

positioning a wafer in the ILS; ; Page 3; par. [0025], line 7-8; Figs. 4, 5a, and 5b.

performing a light exposing operation on the wafer using an objective lens immersed in a first fluid that does not contain surfactant; and; Page 3-4; par. [0025], line 23-27; par. [0027], lines 1-11; par. [0029], lines 1-5; Figs. 4, 5a, and 5b.

cleaning the objective lens using a second fluid comprising a surfactant-spiked water immersion fluid; Page 2-4; par. [0021], lines 3-10; par. [0022], lines 1-17; par. [0023], lines 21-32; par. [0024], lines 1-15; par. [0029], line 1-5; Fig. 5b.



The subject matter recited in Independent Claim 15 of the present application relates to an immersion lithography system comprising:

means for positioning a wafer; Page 3; par. [0025], line 7-8; Figs. 4, 5a, and 5b.

means for providing the first fluid containing no surfactant; Page 3-4; par. [0025], line 15-17; par. [0027], lines 1-4; par. [0029], lines 1-5; Fig. 4.

means for performing a light exposing operation on the wafer using an objective lens immersed in the first fluid; and; Page 3; par. [0025], line 23-27; Fig. 4.

means for providing a surfactant to the first fluid to form a second fluid to reduce an adherence of floating defects to the wafer or the objective lens; Page 2-4; par. [0021], lines 3-10; par. [0022], lines 1-17; par. [0023], lines 21-32; par. [0024], lines 1-15; par. [0025], line 15-17; par. [0026], line 1-10; par. [0027], lines 1-4 and 15-18; par. [0029], lines 1-5; par. [0032], lines 1-13; Fig. 4.

The subject matter recited in Independent Claim 20 of the present application relates to a method for cleaning lens used in an immersion lithography system (ILS), the method comprising:

positioning a wafer in the ILS; Page 3; par. [0025], line 7-8; Figs. 4, 5a, and 5b.

performing a light exposing operation on the wafer using an objective lens immersed in a first fluid; and; Page 3; par. [0025], line 23-27; Fig. 4.

cleaning the objective lens using a second fluid containing surfactant; Page 2-4; par. [0021], lines 3-10; par. [0022], lines 1-17; par. [0023], lines 21-32; par. [0024], lines 1-15; par. [0029], line 1-5; Fig. 5b.

**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

1. Whether claims 15-19 are anticipated by WO 99/49504 under 35 U.S.C. 102(b).
2. Whether claims 2-6 and 8 are unpatentable under 35 U.S.C. 103(a) over Hazelton et al (U.S. Patent Application Publication No. 2006/0023185 hereinafter referred to as "Hazelton") in view of Zhang et al (U.S. Patent Application No. 2005/0161644 hereinafter referred to as "Zhang") in further view of Amblard et al (U.S. Patent No. 7,056,646 hereinafter referred to as "Amblard").
3. Whether claim 7 is unpatentable under 35 U.S.C. 103(a) over Hazelton in view of Zhang and Amblard in further view of Krautschik (U.S. Patent Application Publication No. 2004/0125351 hereinafter referred to as "Krautschik").
4. Whether claims 9-13 are unpatentable under 35 U.S.C. 103(a) over Hazelton in view of Lyons et al (U.S. Patent No. 7,125,652 hereinafter referred to as "Lyons") in further view of Amblard.
5. Whether claim 14 is unpatentable under 35 U.S.C. 103(a) over Hazelton in view of Lyons and Amblard and as evidenced by Zhang.
6. Whether claims 15-19 are unpatentable under 35 U.S.C. 103(a) over Deng et al (U.S. Patent Application Publication No. 2005/0164502 hereinafter referred to as "Deng") in view of Hazelton.
7. Whether claims 20-21 and 23 are unpatentable under 35 U.S.C. 103(a) over Hazelton in further view of Amblard.
8. Whether claim 22 is unpatentable under 35 U.S.C. 103(a) over Hazelton in further view of Amblard in further view of Lyons.

9. Whether claims 24-27 are unpatentable under 35 U.S.C. 103(a) over Hazelton in further view of Amblard in further view of Langford (U.S. Patent No. 5,443,801 hereinafter referred to as “Langford”).

## **ARGUMENT**

### **I. REJECTION OF CLAIMS 15-19 UNDER 35 U.S.C. § 102(b)**

The Final Office Action rejected Claims 15-19 under 35 U.S.C. 102(b) as being anticipated by WO 99/49504. This ground of rejection is respectfully traversed.

Quoting relevant case law, the PTO explains in MPEP §2131 that, under 35 U.S.C. §102:

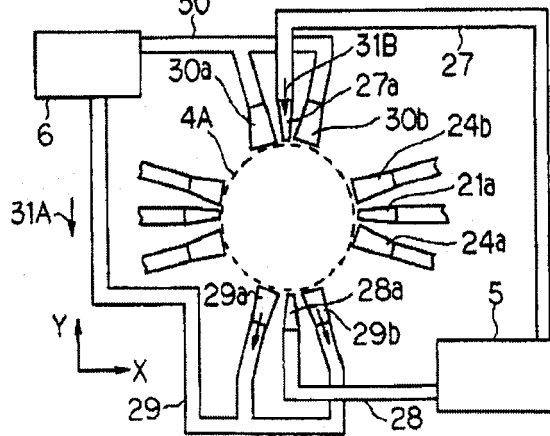
"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). . . . "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim . . . . *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

In other words, to anticipate a claim under §102, a reference (1) must disclose each and every element recited in the claim, and (2) must also disclose these elements arranged in the manner recited in the claim. Applicants' Independent Claim 15 includes a recitation of:

means for providing the first fluid containing no  
surfactant; . . . and  
means for providing a surfactant to the first fluid to form a  
second fluid to reduce an adherence of floating defects to the wafer  
or the objective lens.

Figures 2 and 3 of Fukami, reproduced below, disclose a liquid supply apparatus 5 that can supply an immersion liquid 7 to an immersion lithography region through four conduits 21, 22, 27 and 28:

[Figure 3]



For example, see lines 31-37 on page 19 of the machine-generated English translation of Fukami included in the Evidence Appendix (“...liquid supply apparatus, through at least one of supply hose 21, 22, 27, 28, supplies liquid...to tip portion 4A of lens 4 and between wafer W...”). With reference to lines 1-2 on page 18 of this translation, Fukami explains that “pure water is used as liquid 7”.

In explaining the §102 rejection of Independent Claim 15, the Examiner asserts that the claimed "means for providing the first fluid" is a "primary supply reservoir" that is met by a reservoir shown at 5 in Figure 2 of Fukami, and asserts that the claimed "means for providing a surfactant to the first fluid" is a "secondary supply reservoir" that is met by a different reservoir shown at 5 in Figure 3 of Fukami. But contrary to the assertions of the Examiner, Figures 2 and 3 of Fukami do not show two different reservoirs that each happen to have reference numeral 5. Instead, the apparatus shown at 5 in Figure 2 of Fukami is identically the same apparatus that is shown at 5 in Figure 3 of Fukami. Consequently, the Examiner's interpretation of Fukami is not correct, and Fukami does not anticipate Independent Claim 15 under §102 in the manner proposed by the Examiner.

Further, in regard to the recitation in Applicants' Independent Claim 15 of "means for providing a surfactant to the first fluid to form a second fluid", it is respectfully submitted that Fukami fails to disclose any comparable structure. In this regard, the Examiner never identifies any surfactant in Fukami, and never identifies any structure in Fukami that actually provides a surfactant to any fluid. The informal machine translation of Fukami mentions replacing a dirty lens, but does not appear to contain any mention of the use of any surfactant, or any cleaning liquid. Therefore, and contrary to the assertions in the Office Action, it is respectfully submitted that Fukami does not disclose each and every element recited in Independent Claim 15, and therefore does not meet the requirements for anticipation under §102 that are set forth in MPEP §2131. Consequently, Independent Claim 15 is believed to be allowable over Fukami.

In addition, the Examiner improperly interprets the "means" limitations in Independent Claim 15. MPEP §2182 explains that examination of a means-plus-function limitation must involve the following "two-step" analysis:

1. In the first step, the Examiner must show that the prior art reference performs identically the same function that is specified in the means-plus-function limitation.
2. If and only if the requirement in the first step is met, then in the second step the Examiner looks to the specification and identifies all structure corresponding to that function, and then must show that the prior art structure or step is identical or equivalent to the structure, material, or acts described in the specification.

The Examiner does not actually do this two-step analysis. Instead, in explaining the §102 rejection of Independent Claim 15 in the Office Action, the Examiner completely skips the first step. For example, as noted above, Independent Claim 15 calls for "means for providing a surfactant to the first fluid". Under the first step of the analysis, the Examiner must show Fukami has structure that performs exactly this recited function. However, the Examiner fails to make this required showing. As a practical matter, it is not possible to actually make this particular showing, because Fukami does not appear to disclose any structure that performs

exactly this recited function. The informal English translation of Fukami mentions replacing a dirty lens, but does not appear to mention the use of any surfactant, or any cleaning liquid. Accordingly, it is respectfully submitted that the §102 rejection of Independent Claim 15 is not complete and is thus defective, and it is respectfully submitted that the §102 rejection must be withdrawn.

Moreover, after ignoring the first step of the two-step analysis, the Examiner attempts to perform only the second step. In particular, the Examiner takes each "means" limitation from Independent Claim 15, and replaces it with structural language formulated by the Examiner, thereby effectively producing a completely rewritten version of Independent Claim 15. The Examiner then asserts that this rewritten claim is anticipated by Fukami. However, the rewritten claim is significantly different from Applicants' Independent Claim 15. For example, the Examiner takes Applicants' recited "means for providing a surfactant to the first fluid", and asserts that this is nothing more than "a secondary supply reservoir". However, a secondary supply reservoir is not capable by itself of actually carrying out the recited function of "providing a surfactant to the first fluid". Ultimately, by skipping the first step of the two-step analysis, and by improperly carrying out the second step, the Examiner manages to completely and improperly ignore certain distinctive language that is expressly recited in Independent Claim 15. However, if this distinctive language is properly taken into account, in the manner required by the MPEP, it clearly distinguishes Independent Claim 15 from Fukami.

For each of the reasons discussed above, it is respectfully submitted that Independent Claim 15 of the present application is not anticipated under §102 by the indicated portions of Fukami. Accordingly, Independent Claim 15 is submitted as allowable.

Dependent claims 6-19 depend from and further limit Independent Claim 15, and are submitted as allowable for at least the reasons discussed above.



**II. REJECTION OF CLAIMS 2-6 AND 8 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER HAZELTON IN VEIW ZHANG IN FURTHER VIEW OF AMBLARD**

The Final Office Action rejected claims 2-6 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Hazelton et al (U.S. Patent Application Publication No. 2006/0023185 hereinafter referred to as “Hazelton”) in view of Zhang et al (U.S. Patent Application No. 2005/0161644 hereinafter referred to as “Zhang”) in further view of Amblard et al (U.S. Patent No. 7,056,646 hereinafter referred to as “Amblard”). This ground of rejection is respectfully traversed.

In the present application, Independent Claim 6 includes a recitation of:

performing a light exposing operation on the wafer using  
an objective lens immersed in a first fluid containing surfactant;  
and

cleaning the objective lens after the light exposing  
operation using a second fluid having a higher surfactant  
concentration than the first fluid.

When evaluating obviousness under §103, it is not proper to selectively consider only part of a reference, while ignoring other parts that teach away from the claimed invention. For example, the provisions of MPEP §2141.02 specify that:

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (Emphasis in original).

As to the “cleaning” recited in Independent Claim 6, the Office Action admits that Hazelton '185 does not disclose the use of a liquid containing a surfactant, even when considered with Zhang. Therefore, in each rejection, the Examiner turns to Amblard, and in particular relies

on Amblard's disclosure of an immersion liquid that contains both a developer and a surfactant. However, the specific thrust of Amblard is that the disclosed immersion liquid is used only during immersion lithography, thereby improving the overall efficiency of the immersion lithography process. Amblard repeatedly states that, after immersion lithography has been performed, the immersion lithography apparatus is not again exposed to a developer, and thus is not exposed to the developer-containing immersion liquid after immersion lithography has been performed. (For example, this is discussed by Amblard in lines 58-67 in column 1, lines 8-10 and 46-58 in column 2, lines 58-60 of column 7, and lines 47-50 of column 8). In the present Office Action, the Examiner asserts that Amblard's immersion liquid (containing a developer) could be used as a cleaning liquid, and in particular could be supplied into the immersion lithography arrangement for cleaning after a different immersion liquid is removed. However, Amblard explicitly teaches away from this, by repeatedly stating that "A developer is not contacted with the immersion lithography arrangement after the immersion lithography fluid is removed" (lines 58-60 of column 7, and lines 47-50 of column 8).

In the Office Action, the Examiner basically takes the position that he can "cherry pick" from Amblard the disclosure of a particular liquid, while ignoring other teachings in Amblard regarding that liquid. However, this approach is directly prohibited by MPEP §2141.02 which, as discussed above, specifies that Amblard "must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention".

In the text at lines 7-20 on page 20 of the Office Action, the Examiner asserts that Amblard "does not teach away, since Hazelton . . . does not criticize, discredit, or otherwise discourage using a developer . . . after immersion lithography fluid is removed". However, it is respectfully submitted that this assertion is irrelevant, as the issue of whether Amblard teaches away depends solely on Amblard, and not on anything in Hazelton. Moreover, the Examiner admits that Hazelton is silent on this particular point, and Hazelton's silence does nothing at all to counteract the fact that Amblard does clearly teach away. Amblard strongly and repeatedly emphasizes that the liquid disclosed therein is an immersion liquid that is to be used only during immersion lithography and not afterward. A person of only ordinary skill in the art would have

no motivation to use Amblard's immersion liquid in a manner directly contrary to what is explicitly taught by Amblard. Therefore, and contrary to the assertions of the Examiner, the proposed combination involving Amblard would **not** be obvious.

Since it is well recognized that teaching away from a claimed invention is a per se demonstration of lack of prima facie obviousness, it is respectfully submitted that Hazelton '185 and Amblard do not factually support a prima facie case of obviousness under §103 with respect to Independent Claim 6, with or without regard to Zhang. Accordingly, it is respectfully submitted that Independent Claim 6 is not obvious under §103 in view of Hazelton '185 and Amblard, considered with or without Zhang, and thus Independent Claim 6 is submitted as allowable.

Dependent Claims 2-5 and 8 depend from and further limit Independent Claim 6 and thus are submitted as allowable for at least the reasons stated above.

### **III. REJECTION OF CLAIM 7 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER HAZELTON IN VIEW OF ZHANG AND AMBLARD IN FURTHER VIEW OF KRAUTSCHIK**

The Final Office Action rejected Dependent Claim 7 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in view of Zhang and Amblard in further view of Krautschik (U.S. Patent Application Publication No. 2004/0125351 hereinafter referred to as "Krautschik"). The Applicants submit that Krautschik discloses nothing to remedy the deficiencies of Amblard, discussed above in Section II. As Dependent Claim 7 depends from and further limits Independent Claim 6, it is submitted as allowable for at least the reasons discussed above in Section II.

**IV. REJECTION OF CLAIMS 9-13 UNDER 35 U.S.C. § 103 AS BEING  
UNPATENTABLE OVER HAZELTON IN VIEW OF LYONS AND IN FURTHER VIEW OF  
AMBLARD**

The Final Office Action rejected Claims 9-13 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in view of Lyons et al (U.S. Patent No. 7,125,652 hereinafter referred to as “Lyons”) in further view of Amblard.

In the present application, Independent Claim 9 includes a recitation of:

performing a light exposing operation on the wafer using an  
objective lens immersed in a first fluid that does not contain  
surfactant; and

cleaning the objective lens using a second fluid comprising  
a surfactant-spiked water immersion fluid.

As to the “cleaning” recited in Independent Claim 9, the Office Action admits that Hazelton '185 does not disclose the use of a liquid containing a surfactant, even when considered with Lyons. Therefore, in each rejection, the Examiner turns to Amblard. As discussed above in Section II, Amblard teaches away from this claim recitation. Since it is well recognized that teaching away from a claimed invention is a per se demonstration of lack of prima facie obviousness, it is respectfully submitted that Hazelton '185 and Amblard do not factually support a prima facie case of obviousness under §103 with respect to Independent Claim 9, with or without regard to Lyons. Accordingly, it is respectfully submitted that Independent Claim 9 is not obvious under §103 in view of Hazelton '185 and Amblard, considered with or without Lyons, and thus Independent Claim 9 is submitted as allowable.

Dependent Claims 10-13 depend from and further limit Independent Claim 9 and thus are submitted as allowable for at least the reasons stated above.

**V. REJECTION OF CLAIM 14 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER HAZELTON IN VIEW LYONS AND AMBLARD IN FURTHER VIEW OF ZHANG**

The Final Office Action rejected Dependent Claim 14 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in view of Lyons and Amblard and as evidenced by Zhang. The Applicants submit that Zhang discloses nothing to remedy the deficiencies of Amblard, discussed above in Sections II and IV. As Dependent Claim 14 depends from and further limits Independent Claim 9, it is submitted as allowable for at least the reasons discussed above in Section II and IV.

**VI. REJECTION OF CLAIMS 15-19 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER DENG IN VIEW OF HAZELTON**

The Final Office Action rejected Claims 15-19 under 35 U.S.C. 103(a) as being unpatentable over Deng et al (U.S. Patent Application Publication No. 2005/0164502 hereinafter referred to as "Deng") in view of Hazelton. This ground of rejection is respectfully traversed.

The PTO specifies in MPEP §2142 that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Deng and Hazelton '185 fail to establish a *prima facie* case of obviousness under §103 with respect to Independent Claim 15, for reasons discussed below.

On page 11 of the Office Action, the Examiner admits that Deng does not disclose the recited "means for providing a surfactant to the first fluid to form a second fluid to reduce an adherence of floating defects to the wafer or the objective lens". The Examiner therefore turns to Hazelton '185. In lines 15-19 on page 11, the Examiner asserts that Hazelton '185 discloses in Figure 10:

. . . the pipe on top of a valve #25 . . . which is fully capable of providing a surfactant to the immersion liquid to reduce an adherence of floating defect to the wafer or the optical element.

However, Applicants respectfully traverse the Examiner's interpretation of Hazelton '185. As discussed above, MPEP §2182 specifies that, when analyzing a means-plus-function limitation, the Examiner must show that the structure in the reference actually performs identically the same function that is recited in the means limitation. But in the present situation, there is no identity of function, because the indicated structure in Hazelton '185 does not actually perform Applicants' recited function of "providing a surfactant to the first fluid", or Applicants' recited function of reducing "an adherence of floating defects to the wafer or the objective lens".

More specifically, as to "providing a surfactant to the first fluid", the Examiner asserts that the pipe on top of valve 25 in Figure 10 of Hazelton '185 is "capable of" performing this function. However, that is not the issue. To make the required showing of identity of function, the Examiner must show that Hazelton '185 specifically teaches performing exactly this recited function. But the indicated portion of Hazelton '185 does not teach structure that performs exactly this function. To the contrary, and focusing on function, Hazelton '185 teaches that separate and distinct fluids are used (1) for immersion lithography and (2) for cleaning. For example, the abstract of Hazelton '185 discusses both an "immersion liquid" and a "cleaning liquid", explaining that:

. . . a fluid-supplying device serves to supply an immersion liquid into this gap such that the supplied immersion liquid contacts both the optical element and the workpiece during an immersion lithography process. A cleaning device is incorporated for removing absorbed liquid from the optical element during a cleanup process. The cleaning device may make use of a cleaning liquid having affinity to the absorbed liquid . . . . The cleaning

liquid may be supplied through the same fluid-applying device provided with a switching device such as a valve.

Moreover, in regard to Figure 10, Hazelton '185 explains in paragraph [044] that:

[0044] FIG. 10 shows a different approach to the problem of cleaning the last-stage optical element 4 by applying a cleaning liquid on its bottom surface by using the same source nozzles 21 used for supplying the immersion liquid 7. For this purpose, a switch valve 25 is inserted between the supply nozzle 21 and the liquid unit 5 such that the immersion liquid 7 and the cleaning liquid can be supplied selectively through the supply nozzle 21.

Hazelton '185 teaches that the cleaning fluid has an "affinity" for the immersion fluid, and can thus draw the immersion fluid out of an optical component such as an immersion lens. But contrary to the assertions of the Examiner, Hazelton '185 does not teach that the cleaning fluid is mixed with the immersion fluid. In fact, if Hazelton's cleaning fluid and immersion fluid were mixed in the manner proposed by the Examiner, the affinity of the cleaning fluid for the immersion fluid would be used up by the immersion fluid present in the mixture. As a result, the cleaning fluid would not have any remaining affinity that could later draw immersion fluid out of an optical component. In other words, if Hazelton's cleaning fluid and immersion fluid were mixed in the manner proposed by the Examiner, the mixture would ruin the capability of the cleaning fluid to perform its intended purpose of cleaning optical components. Hazelton would clearly have no use for a cleaning fluid that was not capable of fulfilling its intended purpose of drawing immersion fluid out of an optical component. Hazelton's cleaning liquid can only do its job if it is used completely separately from the immersion liquid. Therefore, and contrary to the assertions in the Office Action, Hazelton would never mix his cleaning liquid with his immersion liquid. This is why the indicated portions of Hazelton never mention any such mixture, because it would render Hazelton's cleaning liquid inoperative and thus unsatisfactory for its intended

purpose. Therefore, Hazelton '185 does not actually disclose the teaching for which the Examiner cites Hazelton.

A further consideration is that Independent Claim 15 recites providing a surfactant to the first fluid to form "a second fluid to reduce an adherence of floating defects to the wafer or the objective lens", whereas Hazelton's system does not perform this specific function. The cleaning liquid disclosed in Hazelton '185 is different from the surfactant-containing fluid recited in Independent Claim 15. Hazelton '185 teaches a cleaning liquid that attracts the immersion liquid, and that can extract the immersion liquid from a lens. That is, the cleaning liquid in Hazelton is specifically designed to attract the immersion liquid, rather than to reduce adherence of floating defects to the wafer or lens. The indicated portion of Hazelton '185 does not contain any teaching that the cleaning liquid in Hazelton '185 is capable of reducing the adherence of floating defects to a wafer or a lens. Thus, the cleaning liquid in Hazelton '185 is different in composition and function from the surfactant-containing fluid recited in Independent Claim 15.

For the reasons discussed above, it is respectfully submitted that Independent Claim 15 of the present application is not rendered obvious by Deng and Hazelton '185, and thus Independent Claim 15 is submitted as allowable.

Dependent Claims 16-19 depend from and further limit Independent Claim 15 and thus are submitted as allowable for at least the reasons stated above

**VII. REJECTION OF CLAIMS 20-21 AND 23 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER HAZELTON IN FURTHER VIEW OF AMBLARD**

The Final Office Action rejected claims 20-21 and 23 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in further view of Amblard.



In the present application, Independent Claim 20 includes a recitation of:

performing a light exposing operation on the wafer using  
an objective lens immersed in a first fluid; and  
cleaning the objective lens using a second fluid containing  
surfactant.

As to the “cleaning” recited in Independent Claim 20, the Office Action admits that Hazelton '185 does not disclose the use of a liquid containing a surfactant. Therefore, the Examiner turns to Amblard. As discussed above in Section II, Amblard teaches away from this claim recitation. Since it is well recognized that teaching away from a claimed invention is a per se demonstration of lack of prima facie obviousness, it is respectfully submitted that Hazelton '185 and Amblard do not factually support a prima facie case of obviousness under §103 with respect to Independent Claim 20. Accordingly, it is respectfully submitted that Independent Claim 20 is not obvious under §103 in view of Hazelton '185 and Amblard, and thus Independent Claim 20 is submitted as allowable.

Dependent claims 21-23 depend from and further limit Independent Claim 20 and thus are submitted as allowable for at least the reasons stated above.

**VIII. REJECTION OF CLAIM 22 UNDER 35 U.S.C. § 103 AS BEING  
UNPATENTABLE OVER HAZELTON IN FURTHER VIEW OF AMBLARD IN  
FURTHER VIEW OF LYONS**

The Final Office Action rejected claim 22 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in further view of Amblard in further view of Lyons. The Applicants submit that Lyons discloses nothing to remedy the deficiencies of Amblard, discussed above in Sections II and VII. As dependent claim 22 depends from and further limits independent claim 20, it is submitted as allowable for at least the reasons discussed above in Section II and VII.

**IX. REJECTION OF CLAIMS 24-27 UNDER 35 U.S.C. § 103 AS BEING UNPATENTABLE OVER HAZELTON IN FURTHER VIEW OF AMBLARD IN FURTHER VIEW OF LANGFORD**

The Final Office Action rejected claims 24-27 under 35 U.S.C. 103(a) as being unpatentable over Hazelton in further view of Amblard in further view of Langford (U.S. Patent No. 5,443,801 hereinafter referred to as “Langford”). The Applicants submit that Langford discloses nothing to remedy the deficiencies of Amblard, discussed above in Sections II and VII. As Dependent Claims 24-27 depend from and further limit Independent Claim 20, they are submitted as allowable for at least the reasons discussed above in Section II and VII.

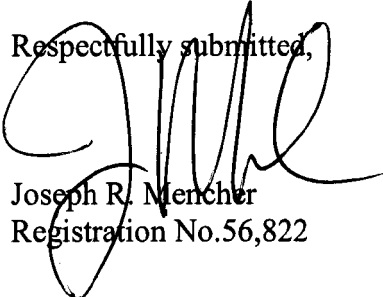
**XII. REQUEST FOR RELIEF**

For each of the various different reasons discussed above, it is respectfully submitted that claims 2-27 are not rendered anticipated under § 102 or obvious under § 103 in view of the cited references. It is therefore respectfully requested that the Board reverse the § 102 and § 103 rejections of claims 2-27.

### **XIII. CONCLUSION**

For reasons discussed above, it is respectfully submitted that the rejections of each of the pending claims 2-27 are erroneous. Accordingly, it is respectfully requested that the Board reverse the claim rejections discussed in the foregoing arguments.

Respectfully submitted,

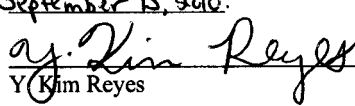
  
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Y Kim Reyes

Enclosures: Claims Appendix  
Evidence Appendix  
Related Proceedings Appendix

**CLAIMS APPENDIX**

1. (Canceled).
2. (Previously Presented) The method of claim 6 wherein the wafer is coated with photoresist.
3. (Previously Presented) The method of claim 6 wherein the first fluid forms an immersion lens.
4. (Previously Presented) The method of claim 6 wherein the surfactant reduces a surface tension of the objective lens with the first fluid.
5. (Previously Presented) The method of claim 6 wherein the surfactant changes a surface property of the wafer to make it more hydrophilic.
6. (Previously Presented) -A method for cleaning lens used in an immersion lithography system (ILS), the method comprising:
  - positioning a wafer in the ILS;
  - performing a light exposing operation on the wafer using an objective lens immersed in a first fluid containing surfactant; and
  - cleaning the objective lens after the light exposing operation using a second fluid having a higher surfactant concentration than the first fluid.
7. (Original) The method of claim 6 further comprising providing the first fluid before starting the light exposing operation.
8. (Previously Presented) The method of claim 6 wherein the first fluid reduces floating defects including photoresist defects or micro-bubbles.
9. (Original) A method for cleaning lens used in an immersion lithography system (ILS), the method comprising:
  - positioning a wafer in the ILS;

performing a light exposing operation on the wafer using an objective lens immersed in a first fluid that does not contain surfactant; and

cleaning the objective lens using a second fluid comprising a surfactant-spiked water immersion fluid.

10. (Original) The method of claim 9 wherein the wafer is coated with photoresist.

11. (Original) The method of claim 9 wherein the first fluid is a de-ionized water.

12. (Original) The method of claim 9 wherein the surfactant is ionic.

13. (Original) The method of claim 9 wherein the surfactant is non-ionic.

14. (Original) The method of claim 9 wherein first and second fluids reduce floating defects including photoresist defects or micro-bubbles.

15. (Original) An immersion lithography system comprising:  
means for positioning a wafer;  
means for providing the first fluid containing no surfactant;  
means for performing a light exposing operation on the wafer using an objective lens immersed in the first fluid; and

means for providing a surfactant to the first fluid to form a second fluid to reduce an adherence of floating defects to the wafer or the objective lens.

16. (Original) The system of claim 15 further comprising means for collecting the first fluid.

17. (Original) The system of claim 15 wherein the first fluid forms an immersion lens.

18. (Original) The system of claim 15 wherein the first fluid is de-ionized water.

19. (Original) The system of claim 15 further comprising means for collecting the second fluid.

20. (Original) A method for cleaning lens used in an immersion lithography system (ILS), the method comprising:
- positioning a wafer in the ILS;
  - performing a light exposing operation on the wafer using an objective lens immersed in a first fluid; and
  - cleaning the objective lens using a second fluid containing surfactant.
21. (Original) The method of claim 20 wherein the wafer is coated with photoresist.
22. (Original) The method of claim 20 wherein the first fluid is a de-ionized water.
23. (Original) The method of claim 20 wherein the second fluid comprises  $\text{NH}_4\text{OH}$ .
24. (Original) The method of claim 23 wherein the second fluid further comprises peroxide ( $\text{H}_2\text{O}_2$ ).
25. (Original) The method of claim 24 wherein the second fluid further comprises water.
26. (Original) The method of claim 20 wherein the second fluid comprises ozone ( $\text{O}_2$ ).
27. (Original) The method of claim 20 wherein the second fluid comprises peroxide ( $\text{H}_2\text{O}_2$ ).

**EVIDENCE APPENDIX**

English Machine Translation of WO 9949504, attached.

**RELATED PROCEEDINGS APPENDIX**

None.